

Claims

- [c1] 1. A multiple battery system comprising:
- a battery housing having a common positive terminal and a common negative terminal each coupled to an electrical system;
 - a main battery having a main positive output and a main negative output;
 - at least one auxiliary battery having an auxiliary positive output and an auxiliary negative output; and
 - a main electrical circuit comprising a coupling of the common positive terminal with a switching device, the at least one switching device having at least two operating positions, a first operating position of the at least two operating positions coupling the common positive terminal to the main positive output of the main battery and to a one-way charging circuit that precedes and is coupled to the auxiliary positive output and a second operating position wherein the common positive terminal is coupled through the at least one switching device to a point in the main circuit beyond the one-way charging circuit that couples to the auxiliary positive output.
- [c2] 2. The multiple battery system of claim 1, wherein the

main battery is electrically isolated from the auxiliary battery in the second position of the at least one switching device.

- [c3] 3. The multiple battery system of claim 1, the battery housing further comprising an at least one main battery compartment containing the main battery.
- [c4] 4. The multiple battery system of claim 1, wherein the main battery is one of a six-volt, a twelve-volt, or a twenty-four volt battery.
- [c5] 5. The multiple battery system of claim 1, wherein only the coupling of the positive output of the main battery and the positive output of the at least one auxiliary battery are switched by the switching device.
- [c6] 6. The multiple battery system of claim 1, wherein the second operating position of the at least two operating positions isolates the main battery from the electrical system and introduces only the at least one auxiliary battery.
- [c7] 7. The multiple battery system of claim 1, the battery housing further comprising an at least one auxiliary battery compartment containing the at least one auxiliary battery.

- [c8] 8. The multiple battery system of claim 1, wherein the at least one auxiliary battery is one of a six-volt, twelve-volt, or twenty-four volt battery.
- [c9] 9. The multiple battery system of claim 1, wherein the main battery is a twelve-volt battery further comprising six, two-volt cells and wherein the at least one auxiliary battery is a twelve-volt battery further comprising six two-volt cells.
- [c10] 10. The multiple battery system of claim 1, wherein the battery housing further comprises a main battery compartment containing the main battery and an at least one auxiliary battery compartment containing the at least one auxiliary battery, the main battery compartment being located atop the at least one auxiliary battery compartment.
- [c11] 11. The multiple battery system of claim 1, the battery housing further comprising at least one fill tube.
- [c12] 12. The multiple battery system of claim 11, wherein the at least one fill tube comprises an at least one main battery fill tube.
- [c13] 13. The multiple battery system of claim 12, wherein the main battery comprises at least one cell and the at least one main fill tube comprises a main fill tube for each cell

of the main battery.

- [c14] 14. The multiple battery system of claim 1, wherein the at least one fill tube comprises an at least one auxiliary battery fill tube.
- [c15] 15. The multiple battery system of claim 14, wherein the auxiliary battery comprises at least one cell and the at least one auxiliary fill tube comprises an auxiliary fill tube for each cell of the auxiliary battery.
- [c16] 16. The multiple battery system of claim 1, further comprising an at least one main fill tube and an at least one auxiliary fill tube, the at least one auxiliary fill tube passing through the main battery compartment.
- [c17] 17. The multiple battery system of claim 1, wherein the one-way charging circuit comprises an at least one-way charging diode.
- [c18] 18. The multiple battery system of claim 17, wherein the at least one-way charging diode further comprises an at least one silicon rectifier.
- [c19] 19. The multiple battery system of claim 18, wherein the at least one silicon rectifier has between about a 25 and 95 amperage rating.
- [c20] 20. The multiple battery system of claim 19, wherein the

main battery is a 12-volt automobile battery and the at least one silicon rectifier has a 12-volt, 45 amp rating.

[c21] 21. The multiple battery system of claim 1, wherein the charging circuit further comprises an at least one high capacity diode and an at least one heat sink coupled to the at least one high capacity diode.

[c22] 22. The multiple battery system of claim 21, wherein the at least one high capacity diode has between about 25 and 95 amperage rating.

[c23] 23. The multiple battery system of claim 22, wherein the at least one high capacity diode has a 12-volt, 45 amp rating and the at least one heat sink coupled to the high capacity diode has a sufficient surface area to dissipate the heat generated by the 12-volt, 45 amp rated at least one high capacity diode.

[c24] 24. The multiple battery system of claim 1, further comprising a controller coupled to and switching the at least one switching device.

[c25] 25. The multiple battery system of claim 24, further comprising an at least one sensor in communication with the at least one controller.

[c26] 26. The multiple battery system of claim 25, wherein the

at least one sensor further comprises an at least one main battery voltage sensor.

[c27] 27. The multiple battery system of claim 26, wherein the at least one sensor further comprises an at least one main battery cold cranking amperage sensor.

[c28] 28. The multiple battery system of claim 27, wherein the at least one sensor further comprises an at least one auxiliary battery voltage sensor.

[c29] 29. The multiple battery system of claim 28, further comprising an auxiliary battery cold cranking amperage sensor.

[c30] 30. The multiple battery system of claim 29, wherein the at least one sensor further comprises an at least one switch position sensor.

[c31] 31. The multiple battery system of claim 29, wherein the controller couples to and communicates with the position sensor to detect the position of the switching device and selectively engages the switching device based on the input of at least one of the at least one main battery voltage sensor, the at least one main battery cold cranking sensor, the at least one auxiliary battery voltage sensor, and the at least one auxiliary cold cranking amperage sensor.

- [c32] 32. The multiple battery system of claim 1, further comprising an auxiliary battery discharge system.
- [c33] 33. The multiple battery system of claim 32, wherein the auxiliary battery discharge system further comprises a controller with a timer.
- [c34] 34. The multiple battery system of claim 33, wherein the timer signals the controller to periodically change the switch position so as to discharge the auxiliary battery in the second operating position of the at least two operating positions for short periods and then switches back to the first operating position of the at least two operating positions.
- [c35] 35. The multiple battery system of claim 32, wherein the discharge system comprises a written instruction to manually switch the battery system to the second operating position for a brief period of time and then to manually switch the switching device to the first operating position.
- [c36] 36. The multiple battery system of claim 32, wherein the controller switches the switching device to couple the common positive terminal to the auxiliary battery positive output if an input signal from an at least one sensor indicates that the main battery voltage or cold cranking

amperage is below a trigger point.

[c37] 37. A multiple battery system comprising:
a battery housing having a common positive terminal and a common negative terminal coupled to an electrical system;
a main battery having a main positive output and a main negative output;
an auxiliary battery having an auxiliary positive output and an auxiliary negative output;
a switching device with at least two operating positions, the at least two operating positions selectively engaging said main battery and said auxiliary battery and comprising;
a first operating position of said at least two operating positions the common positive terminal to the main positive output and auxiliary positive output in parallel with each other, a one-way charging circuit between and preceding the auxiliary battery and;
a second operating position of said at least two operating positions which couples the common positive terminal to the auxiliary positive such that the common positive terminal is coupled at a point beyond the one-way charging circuit to the auxiliary battery positive.

[c38] 38. The multiple battery system of claim 37, wherein the second operating position puts the auxiliary battery

alone in series with the electrical system and prevents electrical energy in the auxiliary battery from flowing to the main battery.

[c39] 39. The multiple battery system of claim 37, wherein the one-way charging circuit electrically isolates the main battery in the second operating position.

[c40] 40. The multiple battery system of claim 37, wherein in the first operating position, the one-way charging circuit permits electrical energy from the electrical system to flow into both the main and auxiliary batteries, but prevents electrical energy from flowing out of the auxiliary battery.

[c41] 41. The multiple battery system of claim 37, wherein only the positive outputs of the main battery and the at least one auxiliary battery are switched by the switching device.

[c42] 42. The multiple battery system of claim 37, wherein the second operating position of the at least two operating positions fully disconnects the main battery from the electrical system and introduces only the at least one auxiliary battery.

[c43] 43. The multiple battery system of claim 37, wherein the main battery is one of a six-volt, twelve-volt, or twenty-

four volt battery.

[c44] 44. The multiple battery system of claim 37, wherein the at least one auxiliary battery is one of a six-volt, twelve-volt, or twenty-four volt battery.

[c45] 45. The multiple battery system of claim 37, wherein the battery housing further comprises a main battery compartment containing the main battery and an at least one auxiliary battery compartment containing the at least one auxiliary battery, the main battery compartment being located atop the at least one auxiliary battery compartment.

[c46] 46. The multiple battery system of claim 37, the battery housing further comprising at least one fill tube.

[c47] 47. The multiple battery system of claim 37, wherein the one-way charging circuit comprises an at least one-way charging diode.

[c48] 48. The multiple battery system of claim 47, wherein the at least one-way charging diode further comprises an at least one silicon rectifier.

[c49] 49. The multiple battery system of claim 48, wherein the at least one silicon rectifier has between about a 25 and 95 amperage rating.

- [c50] 50. The multiple battery system of claim 48, wherein the main battery is a 12-volt automobile battery and the at least one silicon rectifier has a 12-volt, 45 amp rating.
- [c51] 51. The multiple battery system of claim 37, wherein the charging circuit further comprises an at least one high capacity diode and an at least one heat sink coupled to the at least one high capacity diode.
- [c52] 52. The multiple battery system of claim 51, wherein the at least one high capacity diode has between about 25 and 95 amperage rating.
- [c53] 53. The multiple battery system of claim 51, wherein the at least one high capacity diode has a 12-volt, 45 amp rating and the at least one heat sink coupled to the high capacity diode has a sufficient surface area to dissipate the heat generated by the at least one diode.
- [c54] 54. The multiple battery system of claim 37, further comprising a controller coupled to and switching the switching device.
- [c55] 55. The multiple battery system of claim 54, further comprising at least one sensor in communication with the controller.
- [c56] 56. The multiple battery system of claim 55, wherein the

at least one sensor in communication with the controller includes an at least one switch position sensor to detect the position of the switching device and wherein the controller actuates the switching device based on input from the at least one switching device sensor and at least one of a main battery voltage sensor, a main battery cold cranking, an auxiliary battery voltage sensor, and an auxiliary cold cranking amperage sensor.

[c57] 57. The multiple battery system of claim 37, further comprising an auxiliary battery discharge system.

[c58] 58. The multiple battery system of claim 37, wherein the discharge system further comprises a controller with a timer.

[c59] 59. The multiple battery system of claim 58, wherein the timer signals the controller to periodically change the switch position so as to discharge the auxiliary battery in the second operating position of the at least two operating positions for short periods and then switches back to the first operating position of the at least two operating positions.

[c60] 60. The multiple battery system of claim 58, wherein the discharge system comprises a written instruction to manually switch the battery system to the second oper-

ating position for a brief period of time and then to manually switch the switching device to the first operating position.

- [c61] 61. The multiple battery system of claim 58, wherein the controller switches the switching device to couple the common positive terminal to the auxiliary battery positive output if an input signal from an at least one sensor indicates that the main battery voltage is below a trigger point.
- [c62] 62. The multiple battery system of claim 37, further comprising an auxiliary battery cyclic discharge system comprising a timer coupled to the switching device, wherein the timer periodically actuates the switching device to the second operating mode for a short period of time and, then, actuates the switching device back to the first operating mode after the short period of time.
- [c63] 63. An auxiliary battery attachment system comprising:
a main battery with an at least one main positive output and an at least one main negative output;
a circuitry housing having an at least one positive common terminal, an at least one negative common terminal, an at least one positive coupling and an at least one negative coupling, the at least one positive and negative couplings electrically coupling the at least one positive

and at least one negative main battery outputs to the at least one positive and at least one negative common terminals which are in turn coupled to an electrical system; an at least one auxiliary battery having an auxiliary positive output and an auxiliary negative output, each output being electrically coupled to the at least one positive common terminal and at least one negative common terminal, respectively; and a main electrical circuit comprising a coupling of the common positive terminal with an at least one switching device, the at least one switching device having at least two operating positions, a first operating position of the at least two operating positions coupling the common positive terminal through the at least one positive coupling to the main positive output of the main battery and to a one-way charging circuit that precedes and is coupled to the auxiliary positive output, putting the batteries in parallel with each other; and a second operating position wherein the common positive terminal is coupled through the at least one switching device to a point in the main circuit beyond the one-way charging circuit that couples to the auxiliary positive output.

[c64] 64. The auxiliary battery attachment system of claim 63, wherein the circuitry housing is mounted atop the main battery.

- [c65] 65. The auxiliary battery attachment system 63, wherein the circuitry housing is mounted on a side of the main battery.
- [c66] 66. The multiple battery system of claim 63, wherein in the first operating position, the one-way charging circuit permits electrical energy from the electrical system to flow into both the main and auxiliary batteries, but prevents electrical energy from flowing out of the auxiliary battery.
- [c67] 67. The auxiliary battery attachment system 63, wherein the second operating position of the at least two operating positions fully disconnects the main battery from the electrical system and introduces only the at least one auxiliary battery.
- [c68] 68. The auxiliary battery attachment system 63, wherein the at least one positive and negative couplings are within the circuitry housing.
- [c69] 69. The auxiliary battery attachment system 63, wherein the at least one auxiliary battery is one of a six-volt, twelve-volt, or twenty-four volt battery.
- [c70] 70. The auxiliary battery attachment system of claim 63, wherein the circuitry housing contains the at least one

auxiliary battery.

- [c71] 71. The auxiliary battery attachment system of claim 63, wherein the one-way charging circuit comprises an at least one-way charging diode.
- [c72] 72. The auxiliary battery attachment system of claim 71, wherein the at least one-way charging diode further comprises an at least one silicon rectifier.
- [c73] 73. The auxiliary battery attachment system of claim 72, wherein the at least one silicon rectifier has between about a 25 and 95 amperage rating.
- [c74] 74. The auxiliary battery attachment system of claim 72, wherein the main battery is a 12-volt automobile battery and the at least one silicon rectifier has a 12-volt, 45 amp rating.
- [c75] 75. The auxiliary battery attachment system of claim 63, wherein the charging circuit further comprises an at least one high capacity diode and an at least one heat sink coupled to the at least one high capacity diode.
- [c76] 76. The auxiliary battery attachment system of claim 75, wherein the at least one high capacity diode has between about 25 and 95 amperage rating.
- [c77] 77. The auxiliary battery attachment system of claim 76,

wherein the at least one high capacity diode has a 12-volt, 45 amp rating and the at least one heat sink coupled to the high capacity diode has a sufficient surface area to dissipate the heat generated by the 12-volt, 45 amp rated at least one diode.

[c78] 78. The auxiliary battery attachment system of claim 77, further comprising a controller coupled to and switching the switching device.

[c79] 79. The auxiliary battery attachment system of claim 78, further comprising at least one sensor in communication with the controller.

[c80] 80. The auxiliary battery attachment system of claim 79, wherein the at least one sensor in communication with the includes at least one switch position sensor to detect the position of the at least one switching device and at least one of a main battery voltage sensor, a main battery cold cranking amperage sensor, an auxiliary battery voltage sensor, and an auxiliary cold cranking amperage sensor, the switch device being actuated by the controller based on input from one of the at least one sensor.

[c81] 81. The auxiliary battery attachment system of claim 63, further comprising an auxiliary battery discharge system.

[c82] 82. The auxiliary battery attachment system of claim 63, wherein the discharge system further comprises a controller with a timer.

[c83] 83. The auxiliary battery attachment system of claim 82, wherein the timer signals the controller to periodically change the switch position so as to discharge the auxiliary battery in the second operating position of the at least two operating positions for short periods and then switches back to the first operating position of the at least two operating positions.

[c84] 84. The auxiliary battery attachment system of claim 82, wherein the discharge system comprises a written instruction to manually switch the battery system to the second operating position for a brief period of time and then to manually switch the switching device to the first operating position.

[c85] 85. The auxiliary battery attachment system of claim 82, wherein the controller switches the switching device to couple the common positive terminal to the auxiliary battery positive output if an input signal from an at least one sensor indicates that the main battery voltage is below a trigger point.

[c86] 86. A method of detecting a discharge condition fault in

an electrical system, comprising the method steps of:
sensing an initial discharge condition within an electrical system of a vehicle or a piece of machinery;
switching a battery having a main and auxiliary battery and a switching device with at least two operating positions from a main operating position wherein the main and auxiliary batteries are coupled in a parallel electric circuit with a one way charging diode preceding the auxiliary battery, to an auxiliary operating position in which the auxiliary battery is coupled in series with the electrical system of the vehicle or the piece of machinery and the main battery is electrically isolated;
utilizing the auxiliary battery in the auxiliary operational position to start the vehicle or piece of machinery;
returning the switching device to the normal operating position and engaging the main battery in the normal operating position; and
determining whether the vehicle or machinery is operational in the normal operating position, failure indicating a general operating fault in the electrical system.

[c87] 87. The method of claim 86, further comprising the method step of returning the switching device to the auxiliary position and engaging the auxiliary battery to supply the needed energy to operate the vehicle or machinery and seek repair of the electrical fault.

